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1 **Claims**

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3 1. Use of a fluorescent dye doped polymer as an
4 optical fibre, a film or a sheet in a visual
5 display, in which fluorescent light is generated
6 when artificial ambient light, daylight or
7 sunlight enters the doped polymer or optical
8 fibres, characterised in that the optically
9 transparent polymer is doped or blended with
10 organic fluorescent dye molecules chosen from a
11 group comprising PBD, Bis-MSB, 3-3'-
12 diethyloxycarbocyanine-iodide, cresyl violet 670
13 perchlorate, coumarin 6, coumarin 7, coumarin
14 314, 1,8-Diphenyl-1,3,5,7,-octatetrene, Nile
15 red, Sulforhodamine 101 and Solforhodamine 640.

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17 2. Use of a polymer as claimed in Claim 1 wherein
18 the transparent polymer is chosen from the group
19 comprising PMMA, polycarbonate and polystyrene.

20

21 3. Use of a polymer as claimed in Claim 1 wherein
22 the polymer is an optical fibre, the radius of
23 which is between 0.25 and 0.70×10^{-2} meters and
24 the length of the fibre is between 0.2 and 1.6
25 meters.

26

27 4. Use of a polymer as claimed in Claim 3 wherein
28 the magnitude of the fluorescent light emitted
29 from such a fibre is given by the equation
30 $A_a/A_e=2L/r$ wherein A_a is the surface area of the

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- 1 fibre and Ae is the area at which the
2 fluorescent light is emitted.
3
- 4 5. A display comprising a fluorescent dye doped
5 polymer as defined in any of the preceding
6 claims, consisting of a plurality of fibres
7 which may include individual fibres, a film or a
8 sheet, which polymer when excited by light emits
9 the characteristic colour of the dye,
10 characterised in that the polymer is doped with
11 a combination of dyes.
12
- 13 6. A display as claimed in Claim 5 wherein the
14 polymer is doped with two or three dyes
15
- 16 7. A display as claimed in Claim 6 wherein the
17 polymer is doped with Nile Red and Coumarin 6.
18
- 19 8. A display as claimed in Claim 6 wherein the
20 polymer is doped with Nile Red 0.04% and
21 Coumarin 6.
22
- 23 9. A display as claimed in Claim 6 wherein the
24 polymer is doped with Nile Red 0.04%, Coumarin 6
25 and Bis-MSB.
26
- 27 10. A display as claimed in any one of Claims 5 to 9
28 consisting of a plurality of fibres acting as
29 pixels.
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1 11. A display as claimed in any one of Claims 5 to 9
2 in a flat panel conformation wherein the bottom
3 surfaces and edges of the polymer film are
4 covered with a highly reflective additional
5 layer which acts as a mirror performing the role
6 of total internal reflection of all light
7 entering into the polymer.

8
9 12. A flat panel display as claimed in Claim 11
10 whereby the top surface of the polymer is
11 covered with a dielectric polymer film.

12
13 13. A flat panel display as claimed in Claim 11 or
14 Claim 12 wherein the stack is constituted of an
15 alternating sequence of two dielectric films
16 with alternately high and low refractive
17 indices.

18
19 14. A flat panel display as claimed in Claim 12
20 comprising a dielectric stack whereby the
21 composition of this dielectric stack acts as an
22 interference filter to allow substantially 100%
23 transmission of light from air into the polymer
24 for wavelengths used for excitation of the dye.

25
26 15. A flat panel display as claimed in any one of
27 Claims 11 to 13 where the stack has
28 substantially 100% reflection for light
29 wavelengths emitted from the fluorescent dyes,
30 the dielectric layers have been vacuum

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- 1 evaporated, spin coated or sputtered onto the
2 ~~surface~~ of the polymer.
3
- 4 16. A display as claimed in Claim 14 whereby thin
5 films of two different polymers, with the two
6 different refractive indices, can be applied to
7 the polymer surface sequentially and vacuum
8 pressed and/or thermally treated for each layer.
9